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ABSTRACT

A sample consisting of 115 college students participated in a study of the relationships between reading rate, reading comprehension, and related independent variables (attitude, motivation, and interest). A short story was used for obtaining objective rate and comprehension scores for each subject. Two questionnaires designed for the study were used to obtain readers' self reports of their reading processes and attitudes. Contrary to hypotheses, the correlation between rate and comprehension was low (they shared only 7% of the variance), and what readers reported doing in general was related only in a limited way to their specific self reports. As predicted, rate and comprehension were mutually related to attitude, motivation, and interest, but only in a very limited way. The relationships among the independent variables were low to very moderate. These correlations indicated little interrelatedness, which may point to a lack of reader awareness of the reading processes. (Author/RL)

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RATE AND COMPREHENSION IN RELATIONSHIP TO SELF REPORT OF READING PROCESSES AND ATTITUDES OF COLLEGE STUDENTS

AN ABSTRACT OF A THESIS

SUBMITTED TO THE FACULTY

OF THE GRADUATE SCHOOL OF EDUCATION

OF

RUTGERS

THE STATE UNIVERSITY OF NEW JERSEY

BY

JOAN RUNNER RUDDIMAN

IN PARTIAL FULFILLMENT OF THE

REQUIREMENTS FOR THE DEGREE

OF

MASTER OF EDUCATION

COMMITTEE CHAIRPERSON: Martin Kling, Ph.D.

NEW BRUNSWICK, NEW JERSEY OCTOBER, 1981

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APPROVED: Martin Kling
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Josephine Goldsmith
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DEAN: _____
Irene Athey

Dedicated to my mother

Mary E. Runner

1922 - 1980

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CHAPTER I

INTRODUCTION

Problem

The relationship of rate and comprehension in the reading process eludes researchers. Early studies linking rate with comprehension are now questioned. More often, rate and comprehension have been separately researched and reviewed in the literature.

A study of the literature in these areas led to conclusions that certain variables affect both rate and comprehension, as well as pointing to problems experienced in past studies in assessing rate and comprehension.

The question arose, what if purpose and situation of reading were controlled, in order to mirror a pleasure reading situation. Would rate and comprehension be related to each other and would reader self report of variables influencing their reading processes correlate significantly in the self reports?

The first question could be determined by gaining a measure of rate and comprehension. The second question could be assessed by reader self reports.

Statement of the Problem

The purpose of this study was to determine if rate and comprehension are related in a controlled selection that was to be a pleasure reading situation. Furthermore, the study attempted to determine the relationship of the dependent variables Rate and Comprehension to independent variables in two self reports, specifically to the variables of attitude, motivation and interest. The data were analyzed in order to answer the following questions:

1. Would rate and comprehension be significantly related to each other in an objective measurement, and to the subjective self reports by readers of variables common to rate and comprehension?

2. Would readers' self reports of their reading processes and attitudes in general be significantly related to their self reporting of actual reading processes and attitudes specific to a story read?

3. Would rate and comprehension be significantly related to attitude, motivation and interest variables in the readers' self reports?

4. Would independent variables of attitude, motivation, and interest be significantly related to each other?

Hypotheses

The hypotheses tested in this study were:

1. Rate of reading and comprehension will be significantly related to one another and to General and Specific self reports.

2. Readers' self report of general reading processes will be significantly related to self reporting of reading processes specific to a story read.

3. Rate and comprehension will be significantly related to attitude, motivation, and interest.

4. Selected independent variables of attitude, motivation, and interest will be related to each other within their respective scales.

Importance

Very little research on the reading process has been reported on data obtained from self report. Since the early 20th century the reader has been tested and analyzed in the behavioristic tradition. Conclusions of past studies have been based on standardized reading tests, timed reading, eye movement photography, factor analysis, all based on objectively obtained data.

Problems inherent in psychometric testing must be considered. Follman (1973) pointed out the lack of constructive validity and discriminant validity of the subtests of standardized reading tests. The need to explain the skills that have already been identified and to more precisely identify the most important mental skills in reading are cited by Farr (1969), Follman (1973), and Smith (1967).

Most recently, Farnham-Diggory (1980) writing on information processing psychology points out that an intelligence test, for example, is just another task.

> The subject who performs the task will put together a working memory program--as does anyone who is doing anything. But standardized tests give us no information about the nature of these programs, or about differences in programmatic capacities among individuals. The tests only tell us that a certain number of questions were answered correctly. They tell us nothing about how the questions were answered.

It is hoped that a self reporting by mature readers of their reading processes and attitudes correlated with objective measures of rate and comprehension will provide insights into the mental processes used in reading comprehension, and in the reading as a reasoning process.

Definition of Terms

Rate of Reading

In this study, rate of reading was developed from the measurement of total time used to read the short story "The Interlopers" by Saki (H.H. Munro).

Comprehension

Comprehension in this study is defined as the percentage of correct answers to ten recall and inference level questions for the short story, "The Interlopers", as taken from Topics for the Restless, College Reading Series, Edward Spargo, editor, Jamestown Publishers, 1974.

Limitations of the Study

One of the main limitations of this study was the inability to obtain information of intelligence and verbal abilities, such as SAT

scores. With the passage of the Buckley Amendment which limits access to school records and guards the privacy of students against use of names and collection of personal information, no attempt was made to test or ascertain I.Q. or verbal skills. However, the study attempted to control for these factors by choosing the study sample from Rutgers College psychology students. The assumption was that these students should be of average or better intelligence and have average or better verbal skills by virtue of the fact they are matriculated at a college with set standards of admissions, one standard being having a rank in the top 15% of high school graduating class.

Assessment of rate and comprehension is susceptible to the selection read, in this case perhaps biased towards an interest variable. Also, the situation attempts to simulate typical pleasure reading, but the students are in an experiment and know data on time it takes to read the story will be recorded.

The items used in the self report are unique. Though reliabilities on these items are sufficient for research purposes, individual items should be revised for improved reliability before any future use.

CHAPTER II

REVIEW OF THE LITERATURE

The following review is limited to variables of rate and comprehension in mature readers. First, studies dealing with the problems in relating rate and comprehension will be examined, followed by a discussion of the studies and theories on rate of reading and comprehension which identify variables in rate and comprehension. For convenience, this review will deal with the following topics: the relationship of rate and comprehension including problems of assessment; variables linking rate and comprehension, which are intelligence and vocabulary, span of recognition (the visual perception and processing), subvocalization, regression, and flexibility; and the subjective influences of attitude, motivation and interest.

The Relationship of Rate and Comprehension

Rate of reading and comprehension of what is read are historically and empirically two important components of reading. The relationship of the two, however, has long been in dispute. King (1916) found correlations between rate and comprehension ranging between .47 and .92. Judd (1916) concluded in his study that high rate is associated with good quality reading, low rate is associated with poor quality in reading. Other very early

studies, Abell (1894), Sr. Kathleen (1924), concluded that "the relationship between speed and comprehension is reputed to be unquestionably positive."

Eurich (1930) appraised these early studies on rate and comprehension and concluded, "The relationship between speed and comprehension is dependent upon the manner in which each is measured." The actual average of 26 correlations reported in his study was .31, "A positive but not close relationship between rate of reading and comprehension."

Rankin (1962) perceived the problems being within the testing situation. Affecting results are differences in interests, subject matter for example, science and math are not to be read fast according to Anderson and Dearborn (1941) as reported by Rankin (1962). Hurd (1944) with 71 college freshmen found comprehension and speed scores taken from tests with medical literature showed no positive, but actually low correlation. Fast readers comprehended little, if any better than the slowest readers.

Basic test conditions also influence results. Rankin wrote "Putting time limits on reading tests favor fast readers as they finish or answer more questions." Preston and Botel (1951) whose sample was University of Pennsylvania business students found that under timed conditions the correlation of rate and comprehension was .48. A replication study with a similar sample and test under untimed conditions yielded a .20 correlation of rate and comprehension. They concluded the results suggest completely different tests.

Stroud (1942) pointed out that most of the early studies relating speed and comprehension are invalid because the comprehension scores were derived from timed tests, thus they were contaminated by a speed factor. Flanagan (1937) substantiated Stroud's findings.

Problems in Measurement of Rate and Comprehension

Berger (1967), Davis (1962) and others have pointed to basic problems in measurement that have led to misconceptions about speed, what is feasible and what is actually occuring during reading. Davis maintained that words per minute, the most common assessment of speed, is "a meaningless score. Speed must be associated with a score indicating comprehension that has been attained."

Berger (1967) in a review of the controversies in reading rate reported on Braam's formula of rate x comprehension = efficiency. Rauch (1971) and others have pointed out that the fallacy of such a numbers game is that the reader's prior knowledge, poorly constructed tests, simply the guessing factor may yield an acceptable comprehension score when little comprehension actually occured during the speed reading. Carver's (1972) tongue-in-cheek study and Johns (1978) demonstrated no reading has to occur at all. Dembo and Wilson (1973) explained this rate x comprehension = efficiency invalidity. If a reader reports 300 wpm rate and 85% comprehension this yields 255 wpm reading efficiency score. But if the reader reads the title, has prior knowledge, uses test wiseness, etc., and reports he has

read all the material at approximately 20,000 wpm with a comprehension score of 55%, the reading efficiency score is still an impressive, though false, 11,000 words read per minute.

Traxler (1938) in a study of length and reliability of rate of reading tests concluded that the time allowed, to 5 minutes, used in assessing rate of reading was far too short for reliability. Traxler called for tests two or three times that time length. This argument is still valid today with rate of reading tests on standardized reading exams. Farr (1969) also pointed to the Burnett Reading Series: Survey Test, Diagnostic Reading test, and Gates-MacGinitie Reading Tests specifically, noting that most include a comprehension check that for one, assumes faster reading equals better comprehension.

Are Fast Readers Good Readers?

Investigating the relationship of rate and comprehension, Shores and Husbands (1950) with 330 students at the 5th grade level concluded fast readers are not necessarily the best readers.

Carlson (1949) found at higher intelligence levels, faster readers comprehend better. Buswell (1951) linked rate of thinking and rate of reading. In a study with 77 senior college students, Buswell concluded that students high in thinking are high in rate of comprehension in reading, and also in those perceptual factors related to reading. It should be noted, that Buswell began this review of the study with the statement, "It is assumed that rate of reading always means rate at a satisfactory level of comprehension."

As Rankin (1962) concluded:

> Compounding rate and comprehension measurement is at least, in part, responsible for some of the earlier findings that "fast readers are good readers." Other studies show that rate and "power of comprehension" are only slightly related. When material is more difficult, more critical thought processes are involved, purpose is more exacting, the relationship of rate and comprehension is minimal.

Variables Linking Rate and Comprehension

Intelligence and Vocabulary

Holmes (1954) published his initial investigation in what would result in the substrata factor analysis theory of speed and power in reading. A working sample of 126 were given 40 group and individual tests. The next semester these tests were given to a check sample of 94 college students. The ability to comprehend, or "power" in reading, is strongly linked to intelligence and vocabulary. Holmes found intelligence to account for the largest proportion of the variance of the power of reading. Traxler (1955) wrote, "A great deal of evidence (since 1930) shows that the correlation between mental ability and reading comprehension is high." Barbe and Crilk (1952) and Richardson (1950) also concluded that high correlations are found between reading ability—comprehension—and intelligence. For Anderson (1949) intelligence in a factorial analysis was second, 13.2% to vocabulary.

Running a close second to intelligence is vocabulary. Holmes also found vocabulary, (vocabulary in content and vocabulary in isolation) important variables, either first, or a close second to intelligence. For Buswell, (1937), vocabulary was "one of the factors

with the most pronounced effect on the process of reading." Anderson (1949) found that the vocabulary factor contributed 57.6%, more than half the total variance in his factorial analysis.

Davis (1944), Hunt (1957) in using factor-analytical techniques ranked Word Knowledge first which is closely related to Holmes' Vocabulary in Isolation. Spearritt (1972), R.L. Thorndike (1973-1974), and P.E. Vernon (1962) also differentiated vocabulary as a major factor in reading comprehension.

R.L. Thorndike (1972), however, noted the close relationship between intelligence and verbal ability, vocabulary, word knowledge. His studies revealed intelligence to have 90% of the total variance, but he concluded "dichotomizing vocabulary from reasoning is not justified."

Intelligence and Vocabulary With Rate

Rate, as will be further detailed, is directly related to the ability to process ideas quickly while reading. Such efficient information processing relies on a command of the language and the cognitive skills of recall, inference and drawing conclusions. These are attributes of average or better than average intelligence and good verbal skills. As McLaughlin (1969) observed, it would be foolish to try to teach speed reading to one without high verbal intelligence.

Buswell (1951) linked rate of thinking and rate of reading. In a study with 77 senior college students, Buswell concluded that

students high in thinking are high in rate of comprehension in reading, and also in those perceptual factors related to reading.

It is widely believed that vocabulary is important to rate. Buswell (1937) credited vocabulary as one of the most important factors in the reading process. Glass (1967) found vocabulary to be a significant variable in rate of reading.

Flesch (1943) as reported by Chall (1958) made an interesting point in light of the studies of vocabulary significant in comprehension, which also supports Buswell's (1937) conclusions. Flesch noted that beyond the elementary level, i.e., beyond the decoding stage, concern with words is more with relationships between ideas. The influence of vocabulary on readability correlates higher with poorer readers; that is, difficult vocabulary is more likely to raise the readability level for those readers who have difficulty just decoding the word.

Vocabulary's role in rate may be explained in that the efficient, fast reader attends quickly to words, and has such a command of vocabulary in isolation and in context that they can directly process ideas. The literature on comprehension with reading word clusters, and using selective behavior, (Gibson-Levin 1975, La Berge and Samuels 1976) and the literature on rate for span of recognitive and visual perception (Taylor 1960) support this conclusion. Vocabulary is a significant variable in efficiency of rate and comprehension in that it is highly developed and facilitates information processing.

Perception and Processing

What the eye sees and how the mind processes the visual stimuli are important aspects in reading rate and comprehension. The variables in visual perception and processing which have been studied empirically and developed theoretically are span of recognition, which includes fixations and subvocalization, and use of regression, flexibility and prior knowledge.

Buswell's 1937 study is a major resource in this area. His main intention was to make an individual analysis of the nature of reading for adults of varying degrees of education, towards the objective of identifying certain variables which are basic to the reading process and which would serve to differentiate good readers from poor readers. His procedure included giving a visual examination, an intelligence test, a specifically designed test constructed to measure several types of reading abilities. He also took eye movement photographs and interviewed the subjects on their reading habits.

Span of Recognition

Buswell (1937) explained span of recognition as the amount of print recognised in a single fixation. For poor (6th grade education or less) and good (13th grade education or more) readers the number of fixations are 10.6 and 8 respectively, which indicates that good readers have a wider span of recognition per fixation.

Griffith, Walton, and Ives (1974) with 10 year olds found inadequate readers have a wider range of total number of fixations. Holmes (1954) found in slow readers and non-powerful readers, many

more fixations per line of print and a much smaller span of recognition; the latter "appears to be the most fundamental of all the oculomotor (i.e., fixation, regressions, etc.) measurements. The contribution which minimum number of fixations makes to the power reading process is also fundamental."

Degree of difficulty of specific words or the density of ideas in a passage also accounts for the varying duration of fixation. In general, efficient readers spend less time per fixation than inefficient readers.

Buswell (1937) saw the average duration of the pauses of the eyes in reading as a measure of the quickness of perception. The ability to perceive quickly evidently rests on two factors. One of these is familiarity with the object of attention plus a proper technique of analyzing this object. The other seems to be a factor of native reaction time, which, Buswell noted, is difficult to modify. "All major studies of eye movements have indicated that a good reader makes shorter pauses than does a poor reader and that in the reading of difficult material the duration of the pause is longer than in the reading of easy, familiar material."

Buswell's results bear this out:

Average duration per fixation:	poor	good
Selection 1	7.9	7.1
2	8.2	7.6
3	8.2	7.6

Note: Duration fixation decreases with additional years of school (good readers) and are shorter for easier selections (1) than for harder (3).

Griffith (1974) found that inadequate readers tend to fixate longer. Holmes' (1954) results consistently showed, also, that more powerful and faster readers have slower fixation pauses (.261/.265 to .225/.279).

Taylor, Frackenpohl and Pettee (1960) with over 12,000 subjects in an extensive study of components in reading showed the average duration of fixation for college readers at .24 of a second. First graders averaged .33, comparably not much change. However, even in fractions of a second, a decrease in the fixation time indicates better perception and processing of ideas, thus increased efficiency.

Visual Perception

Related to Buswell's duration of fixation is rate of visual perception. Stroud (1945) found some positive, though non-linear, relation between rate of reading and rate of visual perception. Glass (1967) also found high correlation between these two factors, although his methods have been called into question. Thurstone (1944) in studies on perception concluded, in part, that fast readers are better in object judgment and are superior in certain number and word fluency than slower readers.

Samuels, Begy and Chen (1975-1976) found the more fluent readers were faster in word recognition and were superior in awareness when false recognitions were made in a study where all subjects were tested initially and found to be equal in regards to recognizing words flashed on a tachistoscope. But better readers were able to process visually presented words at a fast rate.

Stevens and Orem (1963) in interviews with fast readers found reports of reading part of several lines at each fixation. Schale (1975) discussed the possibility of "vertical" reading, or fixating on squares of print at a time.

McConkie and Rayner (1976 a & b) with stimulus control capabilities of modern computers attempted to identify the perceptual span. They conclude that it appears that different types of information, e.g., identifying word length patterns, identification of word meanings, etc., are acquired different distances into the periphery, and are used for different purposes.

Visual Perception and Comprehension

The literature on variables in comprehension present similar ideas relating to span of recognition and visual processing. Views of the variables in comprehension are drawn from several philosophies and eras in reading. M.D. Vernon (1931) offered a concept of the comprehension process:

> The mature reader passes directly from the visual perception to the meanings and processes of thought—imagery, associated thought, interpretation, evaluation, taken over with acquired meanings derived from language configuration of word, phrase and sentence.

Sullivan (1978) substantiated this by stressing good comprehenders are more flexible in interpreting and transposing information. Citing Gibson and Levin (1975), Golinkoff (1975-1976) and others she summarized the strategies of good comprehenders:

1. Read word cluster, not just words.
2. Attend to qualifiers: e.g. some, most, great, not just nouns and verbs.
3. Can ignore information not readily utilized, selective in word emphasized for use in tasks at hand.
4. Can apply past knowledge and experience to draw conclusions.
5. Apply these strategies at all levels—the "reading as reasoning" concept.

The psycholinguistic view emphasized several of the Sullivan points. The main thrusts are seen in Cooper and Petrosky (1976): the reader reads for meaning, not identification of letters, words, phrases, and Goodman's (1966) emphasis on experience, background and familiarity with the materials being read.

Goldsmith (1975) cited Kolers, Smith and others who maintain the view that "mature readers utilize a wide variety of larger syntactic segments than words or other orthographic units."

Gough (1976) in countering the psycholinguistic theory maintained that the reader is not a guesser, but "he really plods through the sentence, letter by letter, word by word." Brewer (1976), recalling Cattell's studies in the 1880's rejecting the letter or serial theory, argued in favor of whole word or parallel approach.

Automatic Information Processing as presented by La Berge and Samuels (1974) offers another view that may synthesize these arguments. Briefly, the general model of automaticity in reading developed by La Berge and Samuels gives all the relevant memory systems: visual, phonological, episodic and semantic memories. A key in the model is attentions, which is enhanced by automaticity;

i.e., recognition of visual symbols and many basic decoding skills, etc. are "second nature" with practice—experience with reading. The goal of efficient reading is that the reader can maintain his attention continuously on the meaning units of semantic memory, while the decoding from visual to semantic systems proceeds automatically.

Built into this model is the option of several different ways of processing a given word. When the decoding and comprehension processes are automatic, reading appears to be "easy", when they require attention to complete their operations, reading seems to be "difficult".

La Berge and Samuels saw development of automaticity at the heart of developing efficiency in reading. For example, as words become more automatic, higher order chunking processes, or word phrases, are comprehended in one chunk of the semantic memory. Cited as support for this are Taylor's (1960) findings on first grade children making two fixations per word whereas 12th graders make one fixation for about every two words.

One conclusion by Holmes (1962) that evolved from the substrata factor analysis theory was that Range of Information is the most important of the substrata factors in power of reading, which agreed with the psycholinguistic view. Holmes further supported Sullivan and Goodman, etc. who maintained that mature readers process as large an amount of meaning as they can use. This indicates a wider span of recognition which relates the La Berge and Samuels theory of automaticity. Holmes found with non-powerful readers that the eye movement camera reveals a "group-bourne

symptom of more than average number of fixations per line, as well as a deficiency of less than average span of recognition" (which may be lack of efficiency due to low automaticity).

Vocalization in Silent Reading

An underlying variable in visual processing is perhaps the most familiar, but the least empirically studied. Generalizations are made, and the problem discussed, but with limited empirical analysis.

The reader who moves the lips when silently reading is vocalizing and this obviously slows the reading process. Buswell: "Vocalization is symptomatic of an immature reading process which interferes with rapid comprehension of printed material."

The problem in mature readers is not as severe as vocalization but is related, i.e. subvocalization. The reader repeats, mentally, each word, or is a "parrot" (Fry, 1963) to the author. The habitual subvocalizer is word bound and by merely being a parrot is delaying or preventing the processing of the content. Subvocalization may be the single greatest cause of inefficient reading in adults. Stevens and Orem (1963) wrote that "the rapid reader is able to bypass this auditory stage of association which characterizes most readers." Gibson and Levin (1975) offered as one suggestion for overcoming slow reading the attention and control of subvocalization.

Averages for rates of reading are difficult to establish due to the many variables influencing rate such as purpose, e.g. whether casually scanning or reading to remember for a test. Ranges of average rates, however, may focus an awareness of what rates are

within the bounds of efficient reading. Taylor (1960) found the average for college students to be about 280 words per minute (wpm). A generally accepted average range is 200 to 250 wpm for adult readers. Tinker (1965) set casual reading rate at 200 to 300 wpm. The rate of adult speech is not conclusive. Gibson and Levin (1975) set rate of adult speech about 170 to 200 wpm. Sticht (1974) set the normal range of rate for speaking voice at 140-160 wpm. It may be extrapolated from this that rates of reading below 160-170 wpm are indicative of excessive sub or full vocalization, which may mean information and visual perceptual processes are not operating efficiently. Gibson and Levin (1975) pointed out, however, that subvocalization is different from speech, "but our information on this point is meager."

Reducing subvocalization does seem to be, however, a means to improve efficiency. Fry's (1963) suggestion for overcoming the word bound subvocalization was for the reader to carry on a dialogue with the author--ask questions, hypothesize, relate new information to past revelation--all mentally while reading. The reader can not NOT have anything happen mentally while reading, but better to be an active participant in the process via a form of dialogue than to be a passive "parrot". This compliments M.D. Vernon (1931), Sullivan (1978) and psycholinguistic theory which stressed application of prior knowledge and visual perception direct to meaning. Cooper and Petrosky (1976) cited Smith (1971) when acknowledging rates vary even in fluent readers 180 to 600 wpm depending on purpose and familiarity with material.

Holmes (1954) does not discuss vocalization or subvocalization perhaps because of the difficulty of assessment. Buswell (1937) offered no results, though has extensive data from eye photographs and phonograph recordings used in his specific design for assessment.

McGuigan (1970) however, did report that much evidence had been accumulated to demonstrate subvocalization activity during reading, even in mature readers; "While this process may accompany visual information processing, it does not follow that auditory coding is necessary for comprehension of visual symbols."

Regressions and Flexibility

Finally, the amount of regressions and use of regressions in reading are part of the visual processing and do affect rate and comprehension. The ability to be flexible in rate and the use of prior knowledge are interrelated variables.

The psycholinguists describe visual or information processing in their theory. The following, as an example, is Goodman's (1966) explanation for regressions, flexibility and use of prior knowledge in reading as given in the summary description of the process of comprehending in the proficient reader.

> The reader perceives print as large language units. He selects minimal grapho-phonic syntactic, semantic cues and makes tentative choices on the basis of these minimal cues. He continually tests his choices by attempting to decode an acceptable meaning, he goes back to gather more information as it is needed. In this process he utilizes all his relevant past experiences, learning and language development.

Buswell (1937) explained regression and flexibility in terms of rate of reading. He noted regressions are due to a number of causes but maintained that in any type of reading the mature reader will make fewer regressive movements. Results:

	Poor	Good
Regressions per line	2.2	1.1

Griffith (1974) also found more regressive movements among inadequate readers, as did Holmes (1954): per 100 words, 12.8, fast readers; 20.5, slowest readers. For powerful readers, 15.6; non-powerful, 17.3. Taylor (1960) found the average in college to be 15 regressions per 100 words as compared to 52 for first graders.

Some of Buswell's examples of eye movements photographs showed 16 or more regressions on one word. Compared with the average of Taylor's (1960) first graders, a higher number of regressions seem certain indication of a decoding level of reading. Conversely, fast readers have significantly less regressions per 100 words than the average, indicating that fewer regressions reflects higher efficiency.

It is important to note that all readers DO regress, contrary to commercial techniques which train against all regressive movements. The psycholinguistic explanation for this is that good readers allow their eyes to move ahead of the content being processed in order to scan for confirmations or details, and then regress to pick up selected bits of information that are needed, (Goodman 1966). Griffith (1974) may substantiate this theory in

the findings that inadequate readers have fewer forward fixations per line. Golinkoff (1975-1976) in her review of the literature mentioned the "jump ahead" to scan for meaning activity in good comprehenders. La Berge and Samuels (1974) indicated that when automaticity is poor a resulting affect may be repeated glances at a word or line. Athey (1970), and Mathewson (1976) argued that lack of interest, low motivation creates disinterest, hence loss of place or trend of thought. Probably a combination of these theories cause regressions in reading.

Buswell also measured regressive movements due to difficulty in the return sweep. He noted that proper control of the end sweep which connects the end of one line with the beginning of the next requires skill-facilitated by a wider span of recognition. Comparison: poor: 4.4, good: 3.1, medium number of regressive movements preceding and fixation.

Subjective Influences

Underscoring the variables influencing visual perception and processing are the readers' individuality which affect rate and comprehension by what they bring to the reading. Flexibility as seen above is influenced by readers' span of recognition, use of subvocalization, and information processing strategies. Other variables that affect flexibility and overall rate and comprehension are the subjective variables of purpose in reading. attitude, motivation and interest.

Purpose and Flexibility

The literature reviewed to this point shows that fluent readers do exercise flexibility in rate; they vary their span of recognition, vary the duration of fixation, vary the number and reasons for regressions, and even vary, and use if need be, sub and full vocalization.

Those variables that allow for efficient comprehension, i.e., strength of vocabulary, intelligence, background and knowledge, familiarity with content, also affect the speed of processing. Judd and Buswell (1922) found eye movements vary with different reading intention. Cooper and Petrosky (1976) noted that the reader shifts approaches for special materials or depending on purpose. Tinker (1965) also stated that all good readers adjust their rate to the nature of the material, and associates flexibility with nature of reading. Holmes (1962) wrote that the secret of good reading lies in the ability to know when and how to change pace. Laycock (1955) associated a continuum for flexibility of reading habits with general reading ability.

Directly related to flexibility is the purpose for reading. Farr (1969) reported that McDonald (1966) and Sheldon (1955) found that failure to provide specific purposes for reading points to the problems of inflexibility.

Purpose plays a major role in speed, which varies according to how fast words and ideas are perceived. Samuels and Dahl (1975) found speed goes up when purpose for reading is established. Smith (1967) found that good readers will make adjustments in their reading

procedures when directed to read for different purposes (details or general impressions). Tinker (1965) suggested that to help students increase speed, provide a purpose for reading, and, related to the psycholinguists, provide familiarity, knowledge and furnish concepts and techniques that aid in faster processing.

Braam (1963) summed up these concepts by listing three factors he sees influencing speed:

1. Purpose for Reading
2. Prior Knowledge of Subject
3. Degree of Difficulty of Material

Purpose can be subjective, even in controlled situations. For example, a teacher may set purpose, but lack of motivation, interest, or attention can change the individual student's purpose for reading.

These subjective variables are the least researched, though their significance has not been overlooked. Holmes (1954) was one of the few theorists to acknowledge the affective factors in reading. Holmes' substrata factor technique revealed 44% in speed and 22% in power of reading which could not be accounted for from the variables investigated. Holmes hypothesized that the "not accounted for" variance may be found, in part, in motivation, sustained desire for speed and/or comprehension in reading, as well as the idea that the factors must work as an integrating unit, hence organizational and functional fluency, which comes together as reasoning in reading.

But as Athey (1970) pointed out, Holmes' theory does not explain how such factors operate to change what is seen and what is understood, i.e., how the information is interpreted by the reader.

Athey (1970, 1976) provided the empirical evidence to support the notions that feelings are important when a child is learning to read. As Athey (1970) noted, "The intellectual variables involved in reading do not operate in isolation but are modified by the individual's attitudinal and personality characteristics."

Athey readily admitted to the problems faced in personality theory: developing measurement techniques, and the persuasiveness of "global" rather than the "relatively limited" manners of assessment. Therefore, few theorists address these variables.

Mathewson (1976) did present a model based on attitude; motivation; form, content and format; and comprehension, attention, and acceptance, called the "Acceptance Model". This attempts to explain reading on the basis of motivation and attitude towards aspects of reading materials. Further, the model "was designed to predict reading attention and comprehension at any given instant during the reading process", but may also be used to predict reading achievement.

The Acceptance Model, Mathewson emphasized, is not and does not purport to be a full explanation for the reading process. It is however, one of the few models that concerns itself with the role of affect, and therefore, the designer suggests, may serve as a means to visualize relationships that are difficult to conceptualize.

Effect of Interest and Style on Rate

Professionals, specialists, teachers of reading have often noted individual cases where poor readers can read far beyond their independent level (4 levels above have been noted, Ransbury, 1973), when they are interested in the material. Studies on readability shed some light on whether interest can be counted on to overcome deficient or inefficient skills. As reported by Chall (1958), Gray and Leary (1935) asked what makes a book readable for adults of limited ability. Teachers, publishers, librarians ranked four major categories extracted from more than 700 possible factors. The ranking:

1. Content
2. Style of Expressions and Presentation
3. Format or Mechanical Features
4. General Features of Organization

Readers were similarly asked, "What makes a book easy and pleasant to read?" Their ranking:

1. Style
2. Content
3. Format
4. Organization

The professionals' view that content may be a strong attack against difficult readability is not reflected in the readers' opinions. Ruth Strang (1938) in a survey of high school and college students found style, "Plain everyday English," "easy simple vocabulary," "short paragraphs and sentences," ranked first above content (number 2) and format and organization. College students even ranked organization with style, "too many

thoughts per page", saying this was an important consideration in readability of material. These results indicate that deficient skills or inefficiency can deter a reader, even from material of personal interest.

Bryant and Barry (1961) found that for college students, interest was of no consequence in simple narrative passages in a study with students developmental reading programs.

Summary

It is obvious from the literature that the facts on what is involved in reading are not conclusive. Nor is there total agreement of what is significant and to what degree of importance.

There are, however, variables attributed in the literature uniquely to rate or comprehension which are common to each other. Table 1 is a summary of the variables given in the literature with references from the review. The Table is organized to show the commonality of the variables of rate and comprehension. For example, Buswell's, Holmes', Taylor's studies on rate affected by span of recognition and limited fixations are what comprehension studies by the psycholinguists, La Berge and Samuels and others called word clusters.

The overarching concept in Table 1 is that taken together, these individual variables are what constitute efficient reading.

TABLE 1

VARIABLES RELATED TO EFFECTIVE RATE AND COMPREHENSION

Rate Variables	References	Comprehension Variables	References
Intelligence Verbal Ability	Buswell (1937) Holmes (1954) McLaughlin (1969)	Intelligence	Richardson (1950) Barbe & Grilk (1952) Holmes (1954) R.L. Thorndike (1973)
Vocabulary	Buswell (1937) Flesch (1943) Holmes (1954)	Vocabulary	Buswell (1937) Davis (1944) Anderson (1949) Holmes (1954) Hunt (1957) P.E. Vernon (1962) Spearritt (1972) R.L. Thorndike (1972)
Span of Recognition Fixation	Buswell (1937) Holmes (1954) Taylor (1960) Griffith (1974)	Reads Clusters Not Word Bound	Holmes (1962) Goodman (1966) Gibson-Levin (1975) Cooper-Petrosky (1976)
Visual Perception	Stroud (1945) Thurstone (1944) Taylor (1960) Samuels (1975-1976)	Visual Perception Direct to Meaning	M.D. Vernon (1931) Goodman (1966) Sullivan (1978)
Subvocalization	Stevens & Orem (1963) McGuigan (1970)	Notes Qualifiers Selective	Goodman (1966) Gibson-Levin (1975) La Berge & Samuels (1976)

TABLE 1—Continued

VARIABLES RELATED TO EFFECTIVE RATE AND COMPREHENSION

Rate Variables	References	Comprehension Variables	References
Regressions	Buswell (1937) Holmes (1954) Taylor (1960) Griffith (1974)	Information Gathering	Goodman (1966) Golinkoff (1975-1976) La Berge & Samuels (1976)
Flexibility	Judd & Buswell (1922) Buswell (1937) Holmes (1962) Tinker (1965)	Applies Past Knowledge	Holmes (1956) Goodman (1966) Gibson-Levin (1975) Cooper-Petrosky (1976)
Purpose	Laycock (1955) Sheldon (1955) Braam (1963) Tinker (1965) McDonald (1965) Samuels, Dahl (1975)	Flexible	P.E. Vernon (1962) Sullivan (1978)
Motivation	Holmes (1954) Athey (1970, 1976)	Interest Style	Strang (1938) Gray & Leary (1935) Athey (1970, 1976) Ransbury (1973) Mathewson (1976)

CHAPTER III

PROCEDURE

Subjects

Subjects for the study were 115 volunteers from three sections of General Psychology, Fall semester 1980, at Rutgers College. Each student received 1 credit towards a 3 credit requirement of the course to participate in department approved experiments or studies. Most, 113, were Rutgers College students: 73 were freshmen, 34 sophomores, 7 juniors, 1 senior. Male/female ratio was evenly divided, 56 men, 59 women. Major areas of study were liberal arts, 43, social sciences, 34, science, 21, math 8. Of the 115, only 26 answered "yes," they had a reading course or experience with reading improvement course. Of these 26, 19 replied the course had been taken in high school, 3 in college, and 3 as a commercial course. One did not specify where the reading course had been taken.

Because of the strong case made in the literature for the importance of intelligence and vocabulary for good reading, the sample was specifically narrowed to a group that most likely would have these abilities. The regulations of the Buckley Act prevented this study from testing for intelligence and verbal skills. It is

assumed that these college students will have average or better intelligence and verbal abilities, and therefore would be mature readers.

Selection of Tests

The selection, "The Interlopers," by Saki (H.H. Munro) was taken from Topics for the Restless, The College Reading Series, Edward Spargo, editor, Jamestown Publishers, where the story appears in its original form, unaltered in length, structure or vocabulary.

The selection was chosen to control for purpose. A short story narrative, by a respected author, met the requirement set by the study of not being slanted to any particular area of study. Hence there was less chance for individual, or prior knowledge of specific interests that might affect reading rate and comprehension.

Content and form of the material also is important. Buswell (1937) reported that 91% of the 1,000 adults interviewed read newspapers each day, 55% occasionally read magazines, 42% read few books, and 23% read no books ever. This was pre-television. The 1968 Fader report on adult reading reveals little change; 70% of the sample interviewed read newspapers 30 minutes a day, 57% have not read a book since leaving school, both high school and college. Most reported reading for the job, required reading only.

The short story narrative appears in magazines. The content does not present the problems inherent in a news article.

In following Traxler's (1938) suggestions for obtaining a more reliable rate, the story is 2,160 words long, and on the average took 10 minutes to read. Readability level of the selection is appropriate for the intention of the study. A readability check on 21, 100 word passages using Fry's Extended Graph (1977) yielded an average reading level of 8th grade. The range of readability was grammar school to college level. The two low passages were in the last 200 words of the story which, due to the building climax which used the style of very short sentences, the readability level was pulled down. Magazines and newspapers generally have a junior high level of readability. The selection, therefore, is appropriate to the intended purpose of being representative of material read for pleasure.

A check of the vocabulary and semantic levels indicate that the story is on a level appropriate for college students. A selective sample of vocabulary from the story that appeared to be difficult was checked against the Dale and O'Rourke (1979) semantic count. The words and percentage of students at the grade level that know the words are as follows:

Word	Grade Level	Percentage
acquiesed	12	71%
afforded	12	52%
compact	08	76%
exasperation	12	79%
extent	08	82%
hinder	12	76%
languor	12	48%
muster	08	68%
succor	16	54%
sought	08	74%
vain	10	75%
wont	12	20%

In an attempt to deal with the problem of prior knowledge bias and the guessing factor (Rauch, 1971), the selection was chosen also because it provided a well designed comprehension test. Ten questions provide good density to the material in the 2,160 word story. The following shows the type of questions and the cognitive level required in each:

Number	Type of Question	Level
1 & 3	Retaining Concepts	Recall
6	Organizing Facts	Recall
10	Understanding Main Idea	Recall
2 & 5	Making an Inference	Inference
4 & 9	Recognizing Tone	Inference
7	Drawing a Conclusion	Inference
8	Making a Judgment	Inference

The weighting of more inference level questions (6) to recall (4) is a means to test a power of comprehension, not just a score of how many are correct. Carroll (1969) expressed this by noting, "Inference is something more than comprehension in that inference does not automatically occur upon occurence of comprehension." It was believed a more inferential comprehension test would better assess the perception/information processes as understood from psycholinquistic and automaticity models.

Consistent with Flanagan (1937), Preston and Botel (1974), and Stroud (1942), subjects were not given a set time to read or answer the questions. Each session was 60 minutes. When the students asked how long the experiment would take, they were told the session was an hour long, which would be ample time to complete the requirements of the experiment.

Surveys A and B

Surveys A and B (see Appendices A & B) were designed, and twice piloted and revised. The intention was to gather as much information from the readers about their reading attitudes and processes in general and specific to the reading of a story, without biasing the responses. The questions were designed on the basis of what the literature presented as the variables affecting rate and comprehension. The order of the questions was randomized as were the direction of the scaled responses, which were not numbered 1 to 5, but merely indicated by five marks on a line, anchored by the extreme of each variable; e.g. read "word for word," "read groups of words."

Survey A, Reading in General, was intended as a cross check to B, Specific to the Story Read. The two were intended to be completed separately. However, most (64) of the students completed the survey the day of the session, 12 the day before; only 29 completed the Survey A the day they signed up for the session and received the form, which was a week before the session. Therefore no conclusions were reached on the exclusiveness of A to B.

Items 1 - 7 on Survey A (see Appendix A) ask for personal data. Items 6 and 7 were specifically included to see if rate and comprehension correlated to having had additional experience with reading courses.

Table 2 summarizes the parallel design of items in Survey A & B, organized in the format used in the review of the literature.

TABLE 2

PARALLEL ITEMS FROM SURVEYS A & B OF VARIABLES IDENTIFIED IN THE LITERATURE

General, Survey A	Specific, Survey B	Variables	Selected Reference
Rate, General	Rate, Specific		
Span of Recognition	Subvocalization	Visual Perception	Buswell (1937) Cooper & Petrosky (1976)
Information Processing	Use of Prior Knowledge Influence of Prior Knowledge	Information Processing	Holmes (1962) Goodman (1966)
Concentration	Desire to Check Answers	Perception Acuity	Thurstone (1949) Sullivan (1978)
Use of Regression	Amount of Regressions	Regression	Taylor (1960) Golinkoff (1975-1976)
Flexibility, General	Flexibility Within Story Familiarity of Story, Author	Flexibility	Vernon (1962) Tinker (1965)
Opinion of Reading	Assessment of Difficulty	Attitude	James (1890) Gray & Leary (1935) Athey (1970)
Amount Read	Was Story Interesting	Motivation	Holmes (1954) Athey (1970 & 1976) Mathewson (1976)
	Influence of Interest	Interest	Ransbury (1973)

Appendices C and D present Surveys A and B reordered in this same format. The response scales are also reordered with 1 to 5 reading left to right.

Reliability

A computer check for the reliabilities of items 21-28 and 30-44 shows a reliability for Survey A Reading in General is .61; for Survey B, Reading Specific to the Story Read, .65. This is low, but in an acceptable range for research purposes.

The higher reliability correlations in Survey A are for Amount Read, .54; Opinion of Reading, .47; Concentration, .52. These items relate to attitude and motivation in reading.

In Survey B the individual correlations are lower overall. The higher correlations are for Assessment of Difficulty, Related to Interest, .53, and in the .40 range, Familiarity of Story, Author, Assessment of Difficulty Related to Style, and Related to Prior Knowledge, Influence of Interest, and Was the Story Interesting.

Two correlations were negative and very low. Both refer to flexibility: Flexibility in General, -.17, and Flexibility within the Story Read, -.05.

Collection of Data

Survey A was given to the students the day they signed up for the study with the instructions on the form saying to complete and bring the form to the experiment session the following week.

The majority (64) completed the form sometime the day of the session, either before or after the actual experiment.

The students signed for one of four time slots. The groups were evenly divided, 32, 34, 22 and 25 students. The sessions were held in a classroom setting, the door shut with no outside interference.

Because rate can be increased by suggestion or set purpose (Laycock, 1955), the students were told that the experiment was designed to study individual reading processes. They were told they were to read a short story, and that I wanted them to record their time for my data. The large stop clock in the front of the class was explained. Good quality photocopies of the story were handed out, face down, with instructions that everyone would begin at the same time. With particular attention not to influence rate of reading, the students were told "Read this in your normal manner", and then they began.

Because of the small group sizes, when each student finished reading I was able to check the total reading time recorded on the page, at the same time giving the student the comprehension questions and Survey B, telling them to "answer these questions". This was the first indication that comprehension of the material was to be tested, again in an attempt to control purpose of reading, and to resemble a normal reading situation, or "pleasure" reading.

The students were asked to remain seated when finished until everyone was finished. The intention was to prevent a competitive feeling, or a guilt reaction that "I'm the last one done" as well as maintaining a quiet, non-disruptive atmosphere.

The students were NOT told not to look back at the story. Probably from classroom training most did not. Those that did pick the story up again were quietly approached and told not to use the story in answering the questions. The comprehension measurement was intended to reveal how well the readers processed while reading.

At the end of the session, when everyone was seen to have finished, the students one at a time turned in their material, which was checked at that time that all questions 1-10, and everything on the Surveys A and B were answered, and that the total reading time was recorded from the story sheet (which was discarded), to the comprehension questions sheets.

The atmosphere in all groups was relaxed, accepting of the requirements, and congenial.

Treatment of the Data

The comprehension questions were corrected from a master provided by the text, and the total time read was converted to words per minute, from a table in the text Topics for the Restless. Each set was given an ID number 1-115. The responses to Surveys A and B were given the appropriate 1-5 number, and all data was transferred to FORTRAN coding sheets, punched on cards and submitted to computer processing. Statistical Packaging for the Social Sciences (SPSS) was used to list all items, provide Pearson Product-Moment correlations for all 44 variables, and to report the reliabilities for items 13-37.

CHAPTER IV

RESULTS OF THE STUDY

Table 3 shows the range, means, standard deviations of the variables for Rate, Comprehension, individual comprehension items and the self reported information for the total sample of 115 college students.

The average rate, with a range of 145-500 words per minute (wpm) was 261 with a standard deviation of 59. The average comprehension score was 72 with a standard deviation of 16.

The means for the 10 comprehension questions, Retaining Concepts to Understanding the Main Idea, indicate the number of correct, (designated by the number 1), or incorrect (number 0) answers. Items 3 and 7, Retaining Concepts and Making an Inference, had the most missed answers, the latter with more incorrect than correct answers, mean = .35.

The means for Survey A, Self Report of Reading in General and Survey B, Self Report Specific to Story Read, indicate the locations on the scale 1 to 5 of the majority of responses. Most items elicit a neutral response as indicated by the means of 2.83 to 3.51. The items weighted to either 1 or 5 are item 28, 2.33 and item 29, 2.05, Familiarity of Story and Author. Items 27, mean 4.58, and item 24, mean 2.6, were yes or no, 1 or 5 responses only,

TABLE 3

MEANS & STANDARD DEVIATIONS OF DEPENDENT VARIABLES RATE & COMPREHENSION WITH INDEPENDENT SELF REPORTED VARIABLES
(N = 115)

Variable		Mean	Standard Deviation	Range
1.	Rate	261.56	59.42	145 - 500
2.	Comprehension	72.52	15.72	40 - 100
3.	Retaining Concepts	.54	.50	0 or 1
4.	Making an Inference	.82	.39	0 or 1
5.	Retaining Concepts	.82	.39	0 or 1
6.	Recognizing Tone	.73	.45	0 or 1
7.	Making an Inference	.35	.48	0 or 1
8.	Organizing Facts	.70	.46	0 or 1
9.	Drawing a Conclusion	.88	.33	0 or 1
10.	Making a Judgment	.80	.40	0 or 1
11.	Recognizing Tone	.88	.33	0 or 1
12.	Understanding Main Idea	.75	.44	0 or 1
	Survey A			
13.	Rate, General	3.11	.91	1 - 5
14.	Span of Recognition	2.83	1.18	1 - 5
15.	Information Processing	3.36	1.07	1 - 5
16.	Concentration	3.18	1.09	1 - 5
17.	Use of Regressions	3.12	1.21	1 - 5
18.	Flexibility, General	3.50	1.14	1 - 5
19.	Opinion of Reading	3.96	.98	1 - 5
20.	Amount Read	3.51	1.05	1 - 5
	Survey B			
21.	Rate, Specific to Story	2.95	.74	1 - 5
22.	Subvocalization	3.25	1.30	1 - 5
23.	Use of Prior Knowledge	3.24	.94	1 - 5
24.	Desire to Check Answers	2.60	1.97	1 or 5
25.	Influence of Prior Knowledge	1.61	1.96	0 - 5
26.	Amount of Regressions	3.91	1.00	1 - 5
27.	Flexibility Within Story	4.58	1.23	1 or 5
28.	Familiarity of Story	2.33	1.32	1 - 5
29.	Familiarity of Author	2.05	1.32	1 - 5
30.	Assessment of Difficulty	3.78	.96	1 - 5
31.	Related to Interest	3.63	.93	1 - 5
32.	Related to Prior Knowledge	2.86	1.23	1 - 5
33.	Related to Style	3.68	1.10	1 - 5
34.	Influence of Interest	3.71	1.64	0 - 5
35.	Was Story Interesting	3.84	.85	1 - 5

which explains the weighting to the extreme. Item 25, Influence of Prior knowledge is a 0, "no", to 5, "having prior knowledge", with a mean of 1.61.

Table 4 shows the independent variables correlated with the dependent variables, Rate and Comprehension. Of 43 correlations with the dependent variable Rate, 20 were statistically significant at the .05 level of significance. Of the 42 correlations with the dependent variable comprehension, 23 were statistically significant at the .05 level of significance.

Hypotheses

Hypothesis 1: Rate and Comprehension will be significantly related to one another and to General and Specific Self Reports.

The correlation between Rate and Comprehension is .26 which is statistically significant at the .05 level of significance.

Rate was statistically significant to 4 individual comprehension questions: Retaining Concepts, .16; Drawing a Conclusion, .20; Recognizing Tone, .24; and Understanding Main Idea, .20.

The dependent variable Comprehension has a statistically significant correlation to readers' self reports of Rate in General and Specific to the story read, .19 and .25 respectively.

Within the General Self Report, Survey A, 5 of the 8 items were statistically significantly correlated with Rate at the .05 level. The range of correlations was .25 to .41. Overall, the correlation of Survey A, General Self Report with Rate was .45, which is beyond the .01 level of significance.

TABLE 4

CORRELATIONS BETWEEN THE DEPENDENT VARIABLES RATE AND COMPREHENSION WITH THE INDEPENDENT SELF REPORTED VARIABLES
(N = 115)

		Rate	Comprehension
1.	Rate of Reading	—	26*
2.	Comprehension	26*	—
3.	Retaining Concepts	16*	62*
4.	Making an Inference	-02	35*
5.	Retaining Concepts	-01	25*
6.	Recognizing Tone	00	32*
7.	Making an Inference	11	43*
8.	Organizing Facts	07	27*
9.	Drawing a Conclusion	20*	31*
10.	Making a Judgment	04	27*
11.	Recognizing Tone	24*	45*
12.	Understanding Main Idea	20*	44*
13.	Survey A	45*	20*
14.	Rate, General	41*	19*
15.	Span of Recognition	34*	13
16.	Information Processing	13	13
17.	Concentration	28*	12
18.	Use of Regression	14	-08
19.	Flexibility, General	01	01
20.	Opinion of Reading	25*	23*
21.	Amount Read	35*	17*
22.	Survey B	23*	32*
23.	Rate, Specific to Story	39*	25*
24.	Subvocalization	39*	17*
25.	Use of Prior Knowledge	16*	13
26.	Desire to Check Answers	-11	16*
27.	Influence of Prior Knowledge	01	07
28.	Amount of Regressions	01	02
29.	Flexibility Within Story	-01	-20*
30.	Familiarity of Story	08	09
31.	Familiarity of Author	21*	11
32.	Assessment of Difficulty	03	17*
33.	Related to Interest	18*	37*
34.	Related to Prior Knowledge	-00	08
35.	Related to Style	06	24*
36.	Was Story Interesting	18*	32*
37.	Influence of Interest	16*	24*
38.	Age	-21*	-07
39.	Sex	27*	-08
40.	Class	06	-04
41.	Major	-12	-08
42.	College	09	06
43.	Reading Course	02	-03
44.	Level of Reading Course	-04	04

*.05 Level of Significance

Rate to the Specific Self Report, Survey B, yielded 8 correlations of the 15 total items significantly significant at the .05 level. The range of correlations was .16 to .39. The overall correlation of the Survey B, Specific Self Report, to Rate was .23.

Dependent variable Comprehension correlates at the statistically significant .05 level with 3 of the 8 items in Survey A, with a range of .17 to .23. Overall, Comprehension to Survey A correlates .20.

Comprehension to Survey B yields 9 statistically significant correlations of the total 15 items, with one negative correlation, Flexibility Within the Story, -.20. The range is .16 to .37 with an overall correlation of Survey B to Comprehension .32.

Hypothesis 2: Readers' Self Report of General Reading Processes will be significantly related to self reporting of reading processes Specific to a Story read.

Table 5 summarizes the correlation of parallel items from Survey A, General Self Report, and Survey B, Specific Self Report. Of the 11 total, 6 items were statistically significantly correlated at the .05 level. The range of correlations was .16 to .39.

Hypothesis 3: Rate and Comprehension will be significantly related to attitude, motivation and interest.

This section deals with items emphasizing attitude, motivation and interest, specifically items 20, 21 and 32-37.

For Rate, the range of correlations that were significant is from .16 to .35. The range of correlations for Comprehension is .17 to .37.

TABLE 5

SUMMARY OF SURVEY A, GENERAL SELF REPORT VS SURVEY B, SPECIFIC SELF REPORT CORRELATIONS

Survey A	Survey B	Correlation
Rate in General	Rate Specific to Story	.39*
Span of Recognition	Subvocalization	.31*
Information Processing	Use of Prior Knowledge	.16*
Concentration	Desire to Check Answers	.12
Use of Regressions	Amount of Regressions	.04
Flexibility, General	Flexibility Within Story	.13
Opinion of Reading	Assessment of Difficulty	.07
	Related to Interest	.32*
	Related to Prior Knowledge	-.03
	Related to Style	.21*
Amount Read	Was Story Interesting	.33*

*significant at .05 level

Rate is related to general attitude of reading assessed by asking for readers' Opinion of Reading .25 correlation. Comprehension correlates with Opinion of Reading .23. Assessment of Difficulty as an indication of attitude, correlates only to Comprehension, .17. Difficulty Related to Interest correlates to both Rate and Comprehension .18 and .37 respectively. Difficulty Related to Style correlates to Comprehension .24.

Rate has statistically significant correlation, .35, to Motivation, assessed by Amount Read. Comprehension correlates at the .17 level of significance to Amount Read.

Rate and Comprehension are statistically significantly correlated to Influence of Interest and Was the Story Interesting, .16, .18 for Rate and for Comprehension, .24, .32.

Hypotheses 4: Selected Independent Variables of Attitude, Motivation, and Interest will be related to each other within their respective scales.

Several Independent variables correlate significantly with each other. The highest correlations in absolute magnitude were with items on attitude, motivation and interest. Amount Read to Opinion of Reading yielded the highest correlation in the results, .61. Opinion of Reading to Concentration was the second highest with .51 correlation. Rate in General correlated with Opinion of Reading, .36 and to Concentration, .47.

Amount Read correlated with Concentration .49. Amount Read to Span of Recognition, .19, to Use of Regressions, .25 and to Use of Prior Knowledge, .22 are also statistically significant.

Information Processing correlates to Concentration .16. Opinion of Reading to Use of Prior Knowledge correlates at the .35 level of significance.

Interest items in Survey B, Assessment of Difficulty to Interest, the Influence of Interest and Was the Story Interesting, yield more correlations with other variables than any other items. The Influence of Interest and Was the Story Interesting yield .51 correlation. These items with Difficulty Related to Interest were .63 and .69.

Style related to Difficulty yields a higher correlation in relation to difficulty assessment at .58 level of significance, than Interest, .28 or Prior Knowledge, insignificant at .13.

Use of Prior Knowledge yielded low correlations of .16 and .13 to the dependent variables of Rate and Comprehension. The Independent variables for Information Processing, Use of Prior Knowledge, and Influence of Prior Knowledge correlations were low and in general, insignificant.

CHAPTER V

SUMMARY, DISCUSSION, AND CONCLUSIONS

Summary

The purpose of this chapter will be to discuss the results of the study and to offer possible explanations for the results while attempting to relate the explanations to the literature.

The questions asked in this study were:

1. Would there be a significant relationship between Rate and Comprehension to each other and to the General and Specific self reports?

2. Would readers' self reports of their reading processes in general be significantly related to their self reports of processes used in reading a specific story?

3. Would rate and comprehension be significantly related to reader attitude, motivation and interest?

4. Would attitude, motivation and interest variables be significantly related to each other within their respective scales?

The sample consisted of 115 college students from Rutgers College, General Psychology, Fall of 1980. Data collected included objective measures of rate and comprehension, and two questionnaires of self reported items in general and specific to the story read.

Discussion

The Relationship of Rate and Comprehension

An analysis of the results of this study reveal that rate and comprehension in reading are statistically significant at the .05 confidence and correlate .26.

Several aspects must be considered when looking at these results. First, as explained earlier, the range of the sample was narrow, hence correlations between variables will be markedly reduced. Also, the variability of scores is restricted in both dependent variables; rate, 210-280 wpm, comprehension, 50%-100%, therefore correlations between the variables are decreased in absolute value. Finally, the number of cases, 115, allows for a correlation of .16 to be statistically significant at the .05 level. Analysis of the squared correlation coefficients, however, gives an indication of the amount of overlap as well as uniqueness of the variables.

The overlap between rate and comprehension is 6.8%, leaving about 93% variance unaccounted for in explaining the relationship of rate to comprehension. The correlations of comprehension to rate in general and rate specific to the story are statistically significant, though low.

Although the correlations are statistically significant, for practical purposes, the relationship is very limited. These findings agree with Burich (1930) and Holmes (1954) who concluded that rate and comprehension are slightly related but unique.

The systematically low yet statistically significant correlations between rate and specific comprehension items may offer limited support to some of the empirical and theoretical literature.

Drawing a Conclusion and Understanding Main Idea are conceptually linked. The ability to Retain Concepts and Recognizing Tone are influential in reaching conclusions and following the main idea. Ability in these areas reflect quick perception and efficient information processing by the reader, which does affect rate found by Buswell (1937), Holmes (1954) and Taylor (1960) with eye movement, span of recognition/fixation studies. This may also limitedly support Stroud's (1945) findings of some linear correlation between rate and visual perception.

Sullivan's (1978) theory of flexibility in interpreting and transporing information may be seen in the correlation rate to recall and inference level items, retaining concepts and recognizing tone. According to Gibson-Levin (1975), Golinkoff (1975-1976, and Sullivan (1978), this also may indicate efficient processing of ideas, which positively affects rate.

However, it must be noted that most of the variance between rate and specific comprehension items remains to be explained.

Rate and Comprehension to General and Specific Self Reports

The variables common to rate and comprehension reviewed in the literature were limitedly significant, statistically. Rate to Span of Recognition and Subvocalization yielded the highest correlations. These results, though limited at .34 and .39 may lend limited support

to findings by Buswell (1937), Goodman (1966), Griffith (1974), and Taylor (1960) who empirically and theoretically concluded that rate is positively influenced by increased span of recognition and reduced subvocalization. Although psycholinguistic theory underlines the importance of subvocalization as enhancing ability to comprehend (Goodman 1966), the very low correlation of .17 between Comprehension and the self report of Subvocalization was for practical and educational purposes negligible.

The item, Desire to Check Answers, was designed as a means to gauge efficiency of processing information while reading. It had low but statistically significant correlation to Comprehension, as did Concentration to Rate and Using Prior Knowledge to Rate. These results may offer limited support to Gibson-Levin (1975) who see good comprehension an end result of efficient information processing.

The use of regressions, prior knowledge and the importance of flexibility as reviewed in the literature were not supported, however, by these results. The Use of Regressions and Amount of Regressions to Rate and Comprehension were low, and close to zero. Influence of Prior Knowledge to Rate and Comprehension was also insignificant except for Familiarity of Author and Use of Prior Knowledge to Rate, discussed above. These results did not support Goodman's (1966) psycholinguistic theory on the importance of background and familiarity and the role of regressions (Sullivan, 1978) in reading comprehension. Nor were the empirical studies of Buswell (1937), Griffith (1974), and Holmes (1954) on regressions and rate substantiated.

Although there is the statistically significant negative correlation of -.20 between Flexibility Within the Story and Comprehension, the variance accounted for is negligible. Recall also that the reliabilities on these items were negative. The scoring scales for these items were designed so that the responses for varying rate and reading the story at different rates would be 5 points. When coding the data, it was obvious that many of the good readers, with high rate and comprehension scores, responding overall with 4 or 5 responses, responded at the 1 or 2 point on the scales for flexibility items; they did not vary their rate in general or within the story. The other correlations of Rate and Comprehension to Flexibility in General are close to zero, and Flexibility within the Story are low and negative. This indicates a pronounced confusion by the sample of readers about flexibility in their reading process, which may imply that they do not know what flexibility is, or that they do not know how to use flexibility in their reading.

The variation of flexibility within a story or passage and from one piece of reading to another is well supported in the literature from Judd and Buswell (1922) to Cooper and Petrosky (1976). Tinker (1965) clarifies this position by asserting that all good readers adjust rate to the nature of the material. Furthermore, the objective rate and comprehension scores of the sample in the study which reflect efficient reading levels indicate that these students most likely DO vary their rate of speed when reading. But from the results of the self reports, they are unaware of this aspect of their reading processes.

What is clear is that rate and comprehension are the two main components in the reading process. The relationship of the two as seen in Buswell (1937), Holmes (1954) and Judd (1916) is one that is separate but equally important. Tinker argued against assessment of rate without comprehension in 1932, reiterated in his 1965 text:

> Speed at which words can be identified has little significance for reading unless the printed material is comprehended...better to use the term "speed of comprehension" rather than "speed of reading".

What has been demonstrated in this study with college readers is that fast rate does not reflect good comprehension--one is not a precursor, nor a predictor of the other, because there is no systematic relationship between rate and comprehension.

General Self Report by Readers Will be Significantly Related to the Self Report Specific to the Story Read

A further examination of correlations between parallel items from general responses to items specific to the story read which were expected to be significant in fact yield a limited number of statistically significant, though very low, correlations.

The most directly parallel variable, Rate in General to Rate Specific to the Story Read, has a .39 correlation. Statistically this is significant, but again, the variance explained between general rate and specific rate is only about 15%, leaving 85% of the variance unaccounted for. These subjective reports of rate to the objective measurement are low, .40 and .39, respectively, with a variance of 16% or 84% of the variance unaccounted for. It

appears that what the readers report they do with rate in general, is not what they report they did while reading, and neither of these self reports are practically related with the readers' actual performance.

The readers' reporting of Span of Recognition for Reading in General, either word for word or reading groups of words, had statistical significance to their self report of Use of Subvocalization in reading the story. This yielded the highest correlation in absolute value in the set of parallel variables between the General and Specific (Surveys A and B). The items Information Processing and Use of Prior Knowledge which asked how ideas and facts are processed while reading had a low, but statistically significant correlation. These results may indicate an increased awareness on the part of the reader of these variables, and therefore report more accurately on the use of Subvocalization in particular, and to a lesser degree, Information Processing. Reading students from an early age are cautioned against moving their lips while reading and are told not to repeat words to themselves; i.e., subvocalization. They may be more aware of this aspect of their reading, thus explaining the relatively higher correlations for Span of Recognition and Subvocalization to each other and to Rate and Comprehension than found in the other variables.

The variables related to regression and flexibility are insignificant. The only other variables significantly correlated are attitude and motivation items, which are not really directly

parallel: Opinion of Reading to Interest Related to Difficulty, and Amount Read to Was The Story Interesting. Again, the readers would be aware of their own attitudes and motivations, perhaps explaining the consistent significant correlations found with these items.

Rate and Comprehension Will Be Significantly Related to Attitudes, Motivation and Interest

The results for the variables on attitudes, motivation and interest are the most consistently correlated to rate and comprehension. Attitudes, assessed by asking the readers' Opinion of Reading yielded statistically significant but very low correlations to Rate and Comprehension. This lends very limited support to the role of affect in reading (Athey 1970, 1976, Mathewson 1976).

Amount Read designed to assess readers motivation also significantly correlates to Rate and somewhat less to Comprehension. This also lends some very limited support to the Holmes (1954) supposition that motivation may be part of the unaccounted for variance that he could find in rate and comprehension for the college sample he used.

The most influential area was seen in the interest items. The Assessment of Difficulty Related to Interest, the Influence of Interest on the reading, and Was the Story Interesting all were correlated at a statistically significant level to Rate and Comprehension. Ransbury (1973) found interest to be a contributing variable in substantially raising independent reading levels of poor readers. The sample of readers in this study were assumed to

be average or better college level readers, which the overall objective comprehension scores support. Interest does seem to be important to their reading, which does not support Bryant and Barry (1961) who found with college students reading simple narrative passages, interest is of no consequence. One explanation of this discrepancy may be that the full length story used in this study sustained interest more than short passages as used by Bryant and Barry.

The results here, though limited, may indicate that good rate and comprehension scores are achieved by the readers reporting they read more than "some" to "alot", those who enjoy reading, and those who report being interested in the story. These results may limitedly suggest that interest may be the key to more reading, which may then lead to more efficient reading.

Selected Independent Variables of Attitude, Motivation and Interest Will Be Significantly Related to Each Other Within Their Respective Scales.

Opinion of Reading and Amount Read, attitude and motivation variables, yielded relatively the highest correlations, and with the interest items, gave the highest number of statistically significant correlations in the study.

The statistically significant correlations of Amount Read and Opinion of Reading with each other and to Concentration and reading process variables give limited support to an observation made in the literature. Buswell (1937) repeatedly found that laborious readers do not read! A concept proposed by James (1890) adds another dimension to this problem. James identified the properties

of selectivity and capacity of limitation as important characteristics of attention. With capacity limitation he noted we process one thing at a time, except when the processes involved have been so well learned that they can be carried out automatically. As West (1978) points out in Models of Efficient Reading, co-authored by Cohen, "Information processing efficiently is presumably acquired largely as a result of practice." La Berge and Samuels (1974) with their automaticity theory would agree. Carroll (1976) in discussing the nature of the reading process also notes that adult reading is skilled only because all components (he identified eight) are so highly practiced that they merge together into one unified performance. This underscores a common sense rule of reading: readers who read more become increasingly better readers.

The items referring to interest variables also were correlated significantly to each other. The consistently relatively higher correlations (.69, .63, .51) for interest items may indicate the students' awareness of their interest in the story. Readers would be expected to be consciously aware of their attitudes and motivations towards reading.

Another indication of such awareness is consistent, yet low, correlation of Style Related to Difficulty. Gray and Leary (1935) found that college students were aware of the influence of style on difficulty in reading, ranking style first, content second, in a list of four variables. In these results, style has a much

higher correlation to assessment of difficulty, at .55 level of significance, than interest, .28. However, prior knowledge was insignificantly correlated to Assessment of Difficulty.

Several expected correlations as based on the literature did not occur. Goodman (1966), Sullivan (1978) theorize that prior knowledge influences the number and use of regressions and favorably influenced flexibility. These correlations were low, approaching zero.

A point should be made that the selection is taken from a book which is designed to be "relevant, timely, and stimulating... selections which will appeal to indifferent readers," (Preface, Topics for the Restless). Thus, the control for purpose was on prior knowledge, but may be biased towards the interest variable. Use of prior knowledge while reading might be consciously assessed in a self report. If the selection chosen limited the need for prior knowledge, then the lack of significant results for prior knowledge items may indicate this, rather than the lack of awareness on the part of the readers of how they use prior knowledge in reading.

Overall what the results may point to is a need to pedagogically develop awareness of reading processes. Those aspects of reading that readers are aware of, e.g. their attitudes about reading, style, interest, concentration, use of subvocalization, yield higher correlations to rate and comprehension than to other independent variables.

If the use of flexibility and prior knowledge were taught so that reader awareness of these variables were heightened, perhaps they would then yield higher correlations to rate and comprehension, i.e., increase efficiency.

Results from the personal data, asking if the reader had taken a reading course and where, point to a possible fallacy in this suggestion. The correlations of this item were negative and near the zero level with almost every variable on the reading process. This may indicate that training in reading skills has no influence. However, no data is available on the students who took these courses, for what reasons, or on what they were taught and what they retained.

Another conclusion to be inferred from these results may be that students' lack of awareness, and in some cases complete confusion of their reading processes, in part mirrors a problem in the field of reading. Professionally the manner of assessing rate and comprehension varies. The importance of rate and/or comprehension to reading is debated in the literature. The role of and nature of prior knowledge and information processed during reading has yet to be made clear either theoretically or empirically. The students in this study appear to reveal a lack of awareness and ability to articulate what they do while reading, which may be a reflection of the confusion of reading experts.

Notwithstanding the derivation of low to moderate correlations with some variables, there is a great discrepancy between what the literature says is important and how readers perceive their own

reading processes. Further complicating the issue is the possibility that these variables were not properly or fully assessed in the items used in the study.

Conclusions

The study led to the following conclusions:

1. Rate and Comprehension are significantly related though most of the variance remains to be accounted for. This finding is consistent with the literature that rate and comprehension are essentially two different variables.

2. Readers' self reports of reading processes in general although statistically significant to their self reports specific to a story read, essentially, educationally and practically, are different. This finding may indicate lack of readers' awareness of their reading processes.

3. Attitude, motivation and interest are statistically significantly related in a limited way to rate and comprehension.

4. Attitude, motivation and interest are statistically significantly related to each other, although the absolute magnitude of these correlations are low to moderate. Educationally and practically these variables are essentially different.

Suggestions for Further Study

Although numerous studies relating rate and comprehension have been conducted, few have concentrated on the readers' own perceptions of their reading processes. More studies involving

self report or actual reading behavior are needed to understand how readers' processes and attitudes are associated with rate and comprehension.

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APPENDIX A

SURVEY A

INFORMATION ON READING IN GENERAL

APPENDIX A

SURVEY A, INFORMATION ON READING IN GENERAL

This is a copy of the original given to the student.

→ Complete and bring this form to the experiment session.

READING INFORMATION SURVEY

1. AGE: _____ years _____ months
2. SEX: Male Female
3. CLASS YEAR: 1981 1982 1983 1984
4. MAJOR AREA OF STUDY: Liberal Arts Social Sciences Math Science
5. COLLEGE: Cook Douglass Livingston Rutgers
6. Have you ever had a reading course or any experience with reading improvement skills? Yes No
7. If yes, where? High School College Commercial Course

DIRECTIONS: Circle the mark that best applies to how you read.

8. I read — only what I have to ... some ... quite often
9. I regard my reading rate to be — fast ... average ... slow
10. Reading is — enjoyable ... boring

Answer the following in regards to your general reading process.

While reading...

11. my mind wanders ... I have good concentration
12. I read groups of words ... I read word for word
13. I relate what I know, and process ideas and facts ... I have to pull ideas together at the end of a sentence or paragraph
14. I re-read sentences to get the meaning ... I re-read sentences or passages to confirm ideas or facts I thought of while reading
15. I read at various speeds ... I read at a constant speed

Date Completed _____

APPENDIX B

SURVEY B

INFORMATION ON READING SPECIFIC TO THE STORY READ

APPENDIX B

SURVEY B, INFORMATION ON READING SPECIFIC TO THE STORY READ

Copy of the original.

SURVEY OF READING METHODS

DIRECTIONS: Circle the mark that best applies to how you read.

1.	Was your rate of reading this story	slow	usual rate	fast
2.	Was the author of this story	new to you	somewhat familiar	very familiar
3.	Did you relate what you read to ideas you knew or had read before?	all the time		never
4.	Did you think this story was	easy		hard
4a.	Indicate the variables that lead you to respond as you did.	no interest		high interest
4b.		prior knowledge		no prior knowledge
4c.		style easy to read		style difficult to read
5.	Was this story	very familiar	somewhat familiar	new to you
6.	When reading this story did you say words to yourself?	all the time		never
7.	Was the way you read this story influenced by interest?	no	yes	
7a.	If yes, was the way you read this story influenced by your	lack of interest		interest
8.	Was this story interesting to you?	not at all	somewhat	very
9.	Did you read some parts of the story slower or faster than others?	no	yes	
10.	Was the way you read this story influenced by your prior knowledge?	yes	no	
10a.	If yes, was your reading influenced by your	lack of prior knowledge		having prior knowledge
11.	When answering the questions, did you want to look back at the selection?	yes	no	
12.	Did you go back and re-read words or sentences?	all the time		never

APPENDIX C

SURVEY A

GENERAL SELF REPORT, REVISED FORMAT

APPENDIX C

SURVEY A, GENERAL SELF REPORT, REVISED FORMAT

The following items from the Self Reports are reordered to parallel the presentation of results on Tables 2,3,4, and 5.

1. I regard my reading rate to be _____ slow average fast

2. _____
I read word for word — I read groups of words

3. _____
I have to pull ideas together at the end of a sentence or paragraph — I relate what I know, and process ideas and facts

4. _____
my mind wanders — I have good concentration

5. _____
I re-read sentences to get the meaning — I re-read sentences or passages to confirm ideas or facts I thought of while reading

6. _____
I read at a constant speed — I read at various speeds

7. Reading is _____
boring — enjoyable

8. I read _____
only what I have to — some — quite often

APPENDIX D

SURVEY B

SELF REPORT SPECIFIC TO STORY, REVISED FORMAT

APPENDIX D

SURVEY B, SELF REPORT SPECIFIC TO STORY, REVISED FORMAT

1. Was your rate of reading this story
   slow — usual rate — fast

2. When reading this story did you say words to yourself?
   all the time — never

3. Did you relate what you read to ideas you knew or had read before?
   never — all the time

4. When answering the questions, did you want to look back at the selection?
   yes — no

5. Was the way you read this story influenced by your prior knowledge?
   no — yes

5a. If yes, was your reading influenced by your
   lack of prior knowledge — having prior knowledge

6. Did you go back and re-read words or sentences?
   all the time — never

7. Did you read some parts of the story slower or faster than others?
   no — yes

8. Was this story
   new to you — somewhat familiar — very familiar

9. Was the author of this story
   new to you — somewhat familiar — very familiar

10. Did you think this story was
   hard — easy

11. Indicate the variables that lead you to respond as you did.
   no interest — high interest

12.
   no prior knowledge — prior knowledge

13.
   style difficult to read — style easy to read

14. Was the way you read this story influenced by interest?
   no — yes

14a. If yes, was the way you read this influenced by your
   lack of interest — interest

15. Was this story interesting to you?
   not at all — somewhat — very

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EDUCATIONAL BACKGROUND

Trenton State College
Trenton, New Jersey
Graduate
6 credits, 1978, 1979

Douglass College
Rutgers, The State University
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B.A., 1975

Merrimack College
North Andover, Massachusetts
Fall, 1972 - Spring, 1974

Western Maryland College
Westminster, Maryland
Fall, 1971 - Spring, 1972

PROFESSIONAL EXPERIENCE

1975-1978 — English Teacher
McCorristin High School
Trenton, New Jersey

HONORS AND AWARDS

1975 — Magna Cum Laude

Honors in English

Douglass College
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PROFESSIONAL MEMBERSHIPS

International Reading Association

COURSE WORK AT RUTGERS

THE STATE UNIVERSITY OF NEW JERSEY

Spring 1977		Instructor
15:299:561	Foundations of Reading Instruction	M. Kling
Summer 1977		
15:299:564	Remedial Reading	M. Kling
15:299:565	Lab in Remedial Reading	M. Kling
Fall 1977		
15:290:570	Introduction to Learning	P. Griswold
Fall 1978		
15:230:642	Introduction to Adult and Continuing Education	G. Darkenwald
15:290:512	Introduction to Child Psychology	M. Arnold
Spring 1979		
17:610:522	Materials for Young Adults	M. Chelton
Summer 1979		
15:299:515	Reading for Secondary College and Adult Students	M. Kling
Fall 1979		
15:299:566	Seminar in Reading Research and Supervision	M. Kling
Spring 1980		
15:299:599	Masters Thesis in Reading	M. Kling